

CHRONIC OBSTRUCTIVE LUNG DISEASE (COLD)

OR

CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

"COLD" includes three major diseases:

1. Pulmonary emphysema
2. Chronic bronchitis
3. Asthma (not associated with smoking)
4. All result in resistance to and obstruction of air flow.

General Information From 1984 SGR On COLD

- 60,000 deaths per year in U.S. from COLD
- 80 to 90% of these deaths are attributable to cigarette smoking
- over 10 million Americans suffer from either chronic bronchitis or emphysema
- COLD morbidity has greater impact than COLD mortality due to slow progressive nature of disease
- COLD total deaths are increasing from 33,000 in 1970 to 53,000 in 1980 to 60,000 cited in the 1984 SGR
- COLD in women is increasing; the male-to-female ratio has changed from 4.3 to 1 in 1970 to 2.3 to 1 in 1980

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DEFINITIONS

Emphysema

1. Defined anatomically as enlargement of the alveoli with destruction of alveolar walls; elasticity of lungs is destroyed and lung volumes increase; clinically it presents as shortness of breath due to air trapping and inability to expel air; irreversible and progressively worsens over time leading to death due to respiratory failure

Chronic Bronchitis

1. Defined clinically as the presence of cough and sputum production for 3 or more consecutive months out of a year; basically the chronic hypersecretion of mucus; characterized by shortness of breath that comes and goes with pulmonary infection; results in increase in lung infections but generally does not lead to death
2. While emphysema and chronic bronchitis are separate disease processes they are usually found together in the patient and "pure" emphysema or chronic bronchitis is relatively rare

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Asthma

1. Reversible airflow obstruction due to bronchial constriction in response to stimuli such as allergens, exercise, cold air, etc.; bronchodilators are effective

Ruth,

Please make slides

of page 199 and

page 202 from

the 1984 SGR

on Chronic Obstructive

Lung Disease

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"Cigarette smoking has been clearly identified as a major causal factor in the development of pulmonary emphysema in humans. However, an animal model for the development of emphysema using the inhalation of cigarette smoke alone has not been convincingly demonstrated."

1984 SGR p. 277

Animal experiments for the development of emphysema have been successful using

1. oxides of nitrogen
2. ozone
3. aerosolized enzymes
4. cadmium salts
5. diet - zinc, copper deficiencies

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DIAGNOSIS

Main Tools

1. Radiology
2. Pulmonary Function Tests
3. Symptoms
4. Pathology

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Pulmonary Function Tests (PFTs)

Spirometry (Effort Dependent - Three Tests)

- forced expiration maneuver that yields data on lung volumes
- FEV₁; FVC; FEV₁/FVC; all expiratory flow rates are greatly decreased
- PFTs are expressed as percentage of normals; the patient should be representative

Lung Volumes

- COPD is associated with increased reserve volumes
- Emphysema results in increased total lung capacity due to loss of lung elasticity and hyperexpansion
- RV (Reserve volume) and TLC (total lung capacity) increase

Blood Gases

- determine the oxygenation of a patient's blood and the degree of retention of carbon monoxide to assess overall respiratory status
- COPD patients can maintain fairly normal blood gases except when subjected to an exercise test

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Diffusion Capacity (DLCO)

- measures efficiency of exchange of gases across the alveolar walls using mixture of helium and CO
- dependent on total area of alveolar/capillaries

interface and is significantly impaired in emphysema patients due to destruction of alveoli

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Radiology - Emphysema

- Increased radiolucency due to destruction of lung tissue and small blood vessels; look for enlarged air spaces and decreased lung markings; "black holes"

- Overexpanded lungs; increased diameter of chest on A-P chest x-ray; hyperexpansion of ribs permit you to see additional ribs in the lung fields (normal = 9 ribs)

- Low flattened diaphragms

- Heart shadow normal or small

- Presence of rounded bullous formations are important

1. could indicate giant bullous disease or bullous emphysema neither associated with cigarette smoking

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Symptoms - Emphysema

- shortness of breath, especially on exertion
- barrel chested appearance
- hyperresonance of chest (hollow sound when thumped due to overinflation and trapped air)
- intensity of breath sounds diminished (chest is overexpanded and the air moves slowly thus the doctor cannot hear the movement of the air)
- review medical records for these findings

PATHOLOGY - EMPHYSEMA

- biopsy specimens ~~are~~ insufficient
- can only be accurately diagnosed pathologically on autopsy with properly fixed and inflated lung
- pathologist vs. pulmonary physician
 1. pathologist believes emphysema can only be confirmed by microscopic examination of lung tissue
 2. pulmonary physician believes symptoms, PFTs and chest x-rays can yield definitive diagnosis

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EMPHYSEMA TYPES

There are three types of emphysema believed to be distinct anatomically and clinically

1. Panlobular (or panacinar) Emphysema

- the enlargement of air spaces is distributed uniformly along alveolar ducts and alveolar sacs
- more prominent in lower lobes
- associated with the genetic disorder alpha-1-antitrypsin deficiency where the lung lacks an enzyme that prevents the breakdown of elastin by other enzymes
- this type is NOT associated with cigarette smoking

2. Centrilobular Emphysema

- starts in the alveolar sacs of the terminal bronchioles and progresses outward to involve the alveoli in the periphery
- occurs mainly in the upper lobes
- generally associated with cigarette smoking

3. Irregular Or Scar Emphysema

- localized airspace enlargement due to scarring (fibrosis)
- not associated with cigarette smoking

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4. Giant Bullae Disease

- large, spherical, ^{localized} "blebs" or "bullae" with normal lung tissue elsewhere
- generally occur in upper lobes
- can be successfully treated surgically
- not associated with cigarette smoking

Risk Factors

1. cigarette smoking
2. alpha-1-antitrypsin genetic deficiency
3. air pollution (nitrogen dioxide, sulfur dioxide, ozone, etc.)
4. history of respiratory infections / diseases
5. diet / nutrition
6. alcohol
7. occupational exposures with emphasis on exposure to dusts

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SGR Position On Smoking and COPD

1964 SGR

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Roth, type in #1 from
p. VII of 1984 SGR

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1984 SGR

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Roth, type in #2
from p. VII of
1984 SGR

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DEFENSE POINTS

- Does the radiology suggest lower lobe (perilobular) emphysema? Are there bullae present on the chest x-rays?
- Is there pathological confirmation on autopsy?
- Do the PFTs clearly show emphysema? Is there some chronic bronchitis or asthma that accounts for bad PFTs? Is there mixed obstructive and restrictive disease?
- Review medical and occupational history for other risk factors.
- Negative animal inhalation studies; limitations of epidemiology and anomalies in epidemiological data
- No known mechanism for cigarette smoking causation theory
- Only 10 to 15% of smokers get COPD

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